

# DLP 601 M00 0SE CE



## 6 + 1 RELAY MODULE FOR HEATING/COOLING PLANTS

- Up to 6 different channels
- Additional auxiliary circulator pump relay
- Possibility to connect additional relay modules up to 10 units
- Compliant with directives EEC 89/336, 73/23 and 93/68, 99/05 CE

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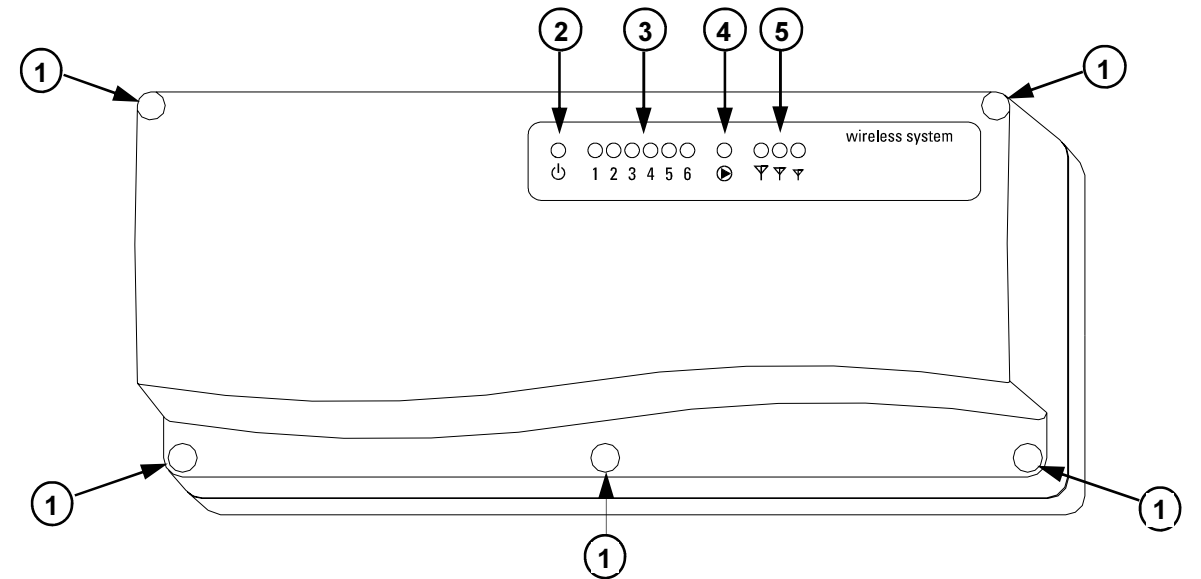


Fig. 1: External aspect

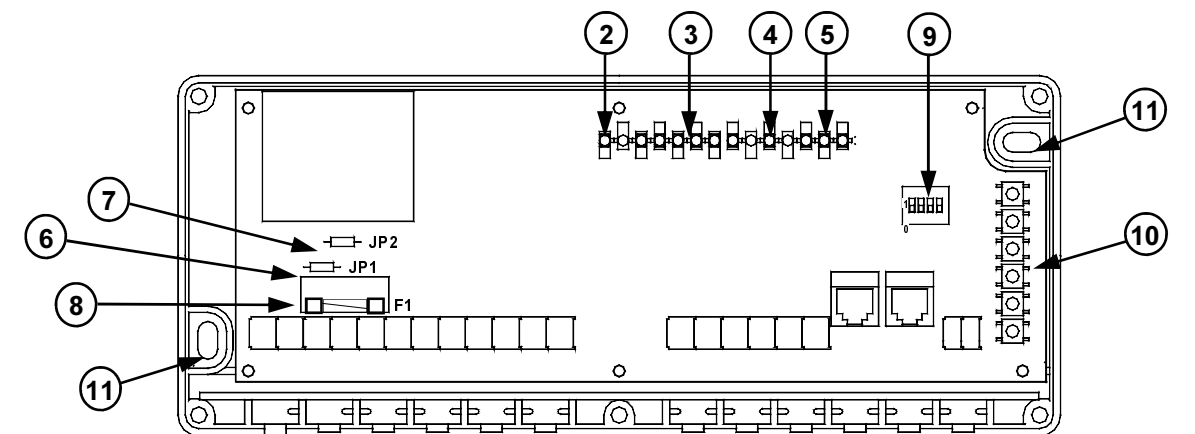


Fig. 2: Internal view

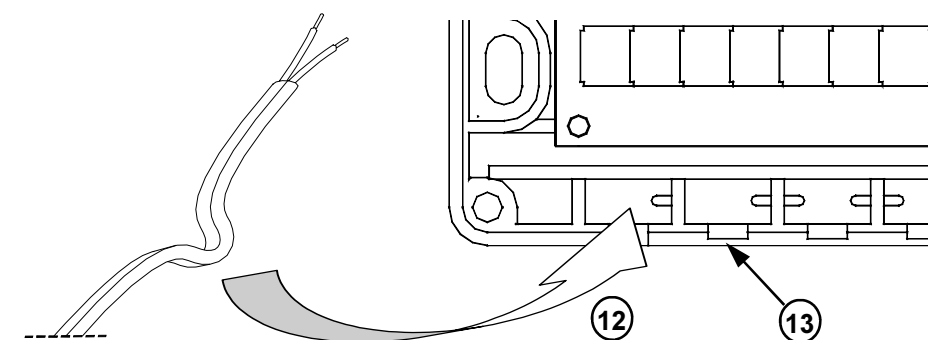


Fig. 3: Cable entry through slot

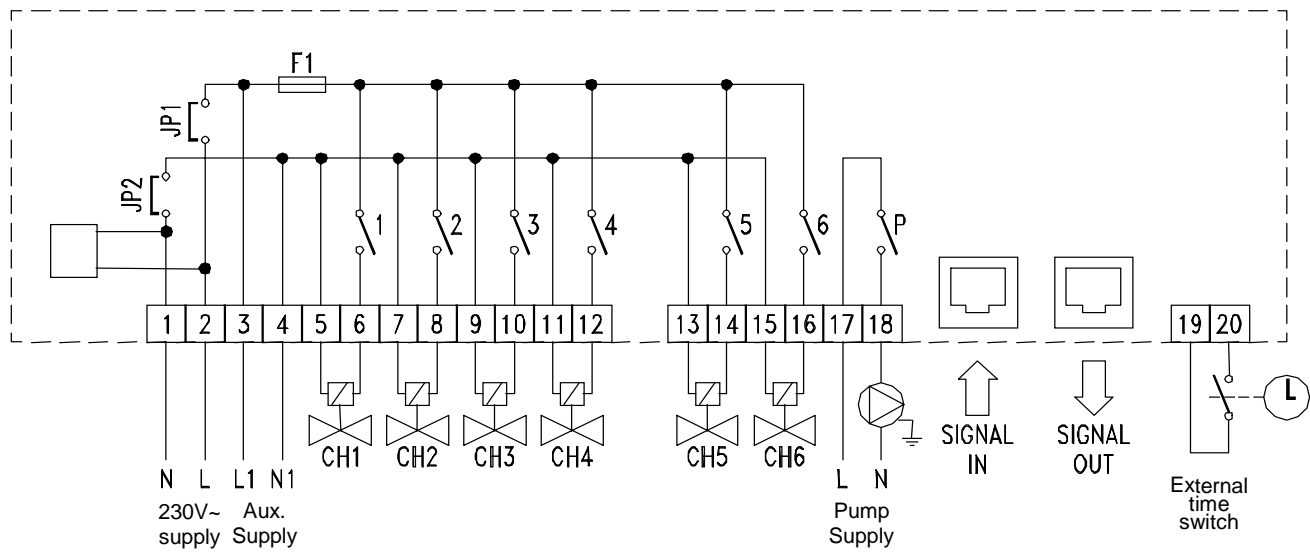


Fig. 4: Wiring diagram

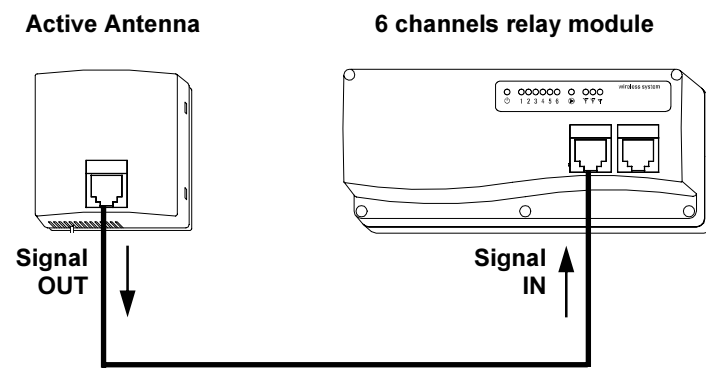


Fig. 5: Data cable wiring for a system based on one active antenna and one 6 channels relay module.

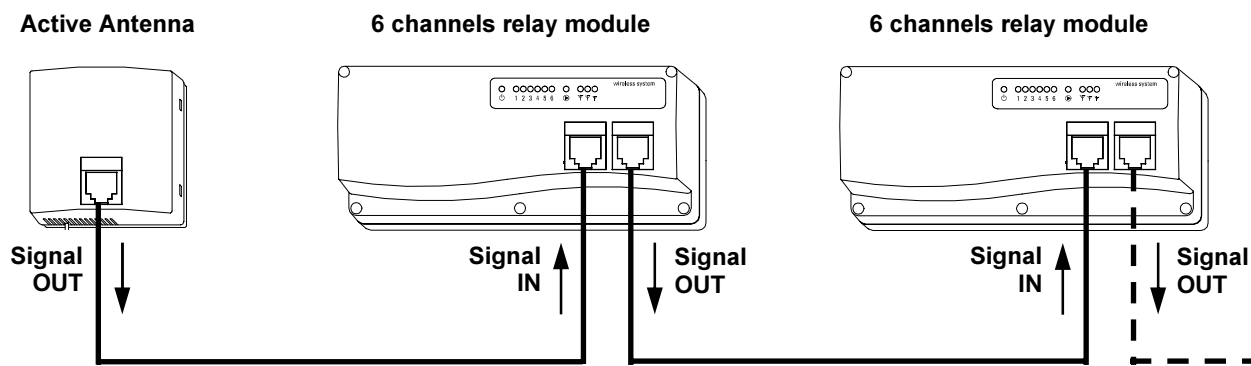


Fig. 6: Data cable wiring for a system with one active antenna and two 6 channels relay modules.

## Technical features

Power supply:	230V~ -15% +10% 50Hz
Power absorption:	3.5 W
Contact rating:	3A @ 250V~ cosφ=1
Maximum total load current:	6A
Circulator contact rating:	3A @ 250V~ cosφ=1
Internal circuit protection fuse:	Self-resetting thermal type
Loads protection fuse:	1A
Protection grade:	IP 30
Operating temperature:	0°C .. 40°C
Storage temperature:	-10°C .. +50°C
Humidity limits:	20% .. 80% RH (non condensing)
Case: Material:	ABS V0 self extinguishing
Color:	Signal white (RAL 9003)
Size:	245 x 100 x 60 mm (W x H x D)
Weight:	~ 850 gr.
Compliant with directives:	EEC 89/336, 73/23 and 93/68 CE

## ⚠ WARNING

- To adjust properly room temperature, install the thermostats far from heat sources, airstreams or particularly cold walls (thermal bridges).
- The appliance must be wired to the electric mains through a switch capable of disconnecting all poles compliant to the current safety standards and with a contact separation of at least 3 mm in all poles.
- Installation and electrical wirings of this appliance must be made by qualified technicians and in compliance with the current standards.
- Before wiring the appliance be sure to turn the mains power off.

## TROUBLE SHOOTING

SYMPTOM	PROBABLE REASON	REMEDY
The module seems to be completely 'dead'. No leds are turned on at all.	Power supply is not present.	Check for the correct supply of the device.
	The thermal fuse is triggered.	Turn off power. Wait at least 15 min. then re-apply power. (see also "Electrical installation" section).
The module works properly, the channel's leds and relays turn on but the valves connected are stuck, always turned off.	The loads fuse is blown.	Be sure that power supply and auxiliary supply are removed, then check for the integrity of the fuse F1 (8) Fig. 2 and replace it with a new one of the correct type and ratings (see also "Electrical installation" section).
One or more channel's led (3) Fig. 1 in the front panel of the receiver blinks.	Those channels are in "alarm status" because their relevant transmitters do not work well.	Check the battery of the relevant transmitters. See their documentation for more information.
When a transmitter is working in test mode the receiver does not activate any relay. In the signal strength indicator all three leds turn on.	Signals issued by the transmitter are correctly received but they do not match any of the addresses stored in the relay module.	Perform the 'self-learning' procedure as indicated in the 'System set up' section for the channel you want to be 'linked' to that transmitter.
With a transmitter working in test mode the module does not activate any relay. The leds of the signal strength indicator are always off or always displaying the last strength indication.	The module gets no data from the SIGNAL IN plug. Check the SIGNAL IN cable, SIGNAL IN and SIGNAL OUT data cables could be mismatched.	Check for the correct wiring of the data cables. The cable connected to the SIGNAL IN plug must come from the active antenna or the SIGNAL OUT plug of another module.
When a transmitter is working in test mode the receiver does not activate any relay. The leds of the signal strength indicator display a weak signal, red turned on, or both red and yellow turned on.	Signals received are too weak for the module to correctly decode the command.	Reposition the transmitters and/or the active antenna. Take care of avoiding positioning them close to metal screens or electrical disturbances sources. Spend some time to find its best place and orientation.

In the view of a constant development of their products, the manufacturer reserves the right for changing technical data and features without prior notice. The consumer is guaranteed against any lack of conformity according to the European Directive 1999/44/EC as well as to the manufacturer's document about the warranty policy. The full text of warranty is available on request from the seller.

## Overview

This device is a relay module for activation of loads (namely thermal actuators or circulators) in wireless heating or cooling plants for rooms or offices. It features 6 independent channels which in turn might be linked up to the same number of transmitters.

This system is definitely the best solution in all those buildings where no wires can be laid between the thermostat and the heating-cooling room.

## Operation

Every single thermostat transmitter issues some 'radio commands' directed to the active antenna according to the need for heating or cooling in the room where the thermostat is actually located, as well as to its own set-up.

These 'radio commands' are then received by the active antenna, which is installed in a convenient position in the room where the burner or the chiller are located.

The active antenna then sends the digital data through a data cable to the relay module, so that only the relay matched with its relevant transmitter turns on and off according to the regulation needs.

Every relay output can be connected to a valve which will control the flow of hot/cold water in the relevant room heating/cooling system.

In addition to the channel outputs the module features an 'auxiliary' output, which is activated every time at least one valve output (channels 1 .. 6) is turned on (see also 'Master Pump' operation).

While working, the module continuously monitors every channel state to recognize a possible malfunction of the transmitters.

Particularly if a channel state is not updated by a command from the relevant transmitter in 90 minutes, this channel will be put in an "alarm status".

When in "alarm status" the relevant led output blinks, and an action is performed.

The action can be chosen from turn off the output or to always provide a 30% power.

How to set this function modality will be explained in the next sections.

## Mechanical description

On the front panel of the module, visible in Fig. 1, eleven indicators are found:

- the 'power' green led (2) turns on when the unit is 230V~ supplied.
- the 6 red channels' leds (3) which display the relevant output state.
- the yellow 'auxiliary' circulator pump led (4) which displays the circulator output state.
- the received signal strength leds (5)

To install the receiving unit it is necessary to access to the internal parts.

When opening the case always ensure that the unit is disconnected from the 230V~.

To open the case, unscrew the five screws (1) Fig. 1: after this the panel is easily removable.

The internal layout is shown in Fig. 2.

JP1 (6) and JP2 (7) are the bridges to be removed when using an auxiliary power supply for the loads.

F1 is a 1A fuse protecting the loads (8).

The dip-switch for the "Option" settings is shown (9).

The set of pushbuttons (10) for the self-learning of the transmitters codes is also highlighted in Fig. 2.

There are six buttons each of those is related to one channel.

## System set-up

The receiving system is composed at least of an 'active antenna' and a 'module relay' (but several module relay can be wired in chain to enlarge the outputs number).

Wire carefully the power supply and the outputs at the device side, then, with the unit turned off. Insert the cable interconnecting the active antenna and the relay module in the proper plugs.

The cable coming from the active antenna must be inserted in the plug labeled as 'SIGNAL IN' on the board.

In case further relay modules are used, connected in a chain fashion: the interconnection cable provided with the module must be plugged between the 'SIGNAL OUT' plug and the 'SIGNAL IN' plug of the unit following in the chain.

The last unit in the chain will have its 'SIGNAL OUT' plug unconnected.

Consider that up to 10 relay modules can be wired in chain through the 'SIGNAL IN' and 'SIGNAL OUT' plugs.

Double check every connection and proceed as follows (it is assumed that you already set-up the transmitter codes as described in the transmitter instruction sheet):

1. Turn on the relay module: the leds will be flashing for a while during the start-up sequence.

2. Turn on one transmitter and put it into 'test mode' (this means that it will issue a continuous sequence of 'on' and 'off' commands, every 3 seconds).

3. In order to 'match' every single transmitter with the desired receiving channel a simple set-up procedure has to be made: the desired channel on the receiver must 'learn' the address code of the relevant transmitter. This operation is really very simple thanks to the self-learning capability of the module.

Whichever is the transmitter code, the module detects a correct code and stores it in a non-volatile memory.

Press for one second the pushbutton relative to the channel which you want to 'link' to the active transmitter:

The self-learning procedure is initiated and the channel led flashes quickly. When a correct code sequence is detected it is stored in memory and then the channel led flashes slowly three times.

After the self-learning the output relay will soon start turning on and off every 3 seconds, following the transmitter commands.

4. Test each thermostat transmitter with the 'test' function for location and functionality in order to be sure that the received signal is strong enough for a good reception: check also the "signal strength indicator". Do not test more than one transmitter at the same time to avoid malfunction due to signals overlapping.

5. When the overall behaviour is satisfactory proceed with the definitive mechanical and electrical installations.

## Notes

The module can show which channels has been assigned to an address code and which has not.

During the start-up sequence, when the unit is first powered, the leds in the front panel (3)(4)(5) Fig. 2, blink three times.

Afterwards the unit turns on for a while only the active channels' led: the channels that has been assigned to an address code.

The 'non active' channels' leds remain off.

If the system needs less than six thermostats and so it does not need all the six channels outputs, it is important to keep the unused channels 'non active' by not assigning them any address code.

The unit will ignore the 'non active' channels being not wired to any valve.

This is useful for the correct driving of the auxiliary circulator pump output.

### Setting a channel as 'non active'

In case an active channel output has to be turned to 'non active', its address memorization can be 'erased' by the following procedure:

1. Press the desired channel's button (10) Fig. 2 and keep it pressed.
2. The relevant led flashes quickly, then after a few seconds it will flash slowly three times.
3. Release the button.
4. Disconnecting the power supply for a while will reset the module so during the start-up the unit will show which channels are still active.

When a channel is 'non active', it will be ignored in all the functions, and its relevant relay will stay always turned off, whichever the received signals are.

### Signal strength indicator

The module is equipped with a signal strength indicator which simplifies the installation and troubleshooting of the whole system.

It is made of three coloured leds located on the right upper part of the receiver case, see (5) Fig. 1.

When a signal burst is received the three leds turn off for a while.

After this the leds turn on indicating the received signal's strength.

The received signal's strength will remain displayed by the leds until another burst is received.

The meaning of the leds is described in the following:

**Green:** the received signal is very good and the communication is reliable.

**Yellow:** the received signal is still sufficient but the communication is not so reliable, it might be corrupted by occasional disturbances.

**Red:** the received signal is poor and therefore the communication is definitely not reliable. Check for location of both the transmitter and the active antenna connected to the unit.

Two leds at once may turn on to indicate a midway strength condition.

The whole three leds are turned on together when is received a signal which address is not programmed in any unit's channel.

The whole three leds on, will be displayed for a while, then the previous signal's strength is recalled.

In order to correctly understand the strength indicator's leds take into account the following.

The average behaviour of a couple of minute test should be evaluate. If the green led turns on and sometimes even the yellow one's do, then the received signal is good.

When the received signal is not sufficient the green led does not turn on at all.

The signal is too poor and the communication is not reliable when the red led turn on often.

If the signal strength is not acceptable try to change the position of the transmitter or the receiving antenna.

Remember that they must be placed far from metal sheets or reinforced cement walls which could weaken the radio signals.

### Outputs control and special options

When the relay module is correctly powered, the green led (2) Fig. 1 is turned on.

At the start-up to perform a led test, the leds in the front panel (3)(4)(5) Fig. 2, blink three times. Afterwards the unit displays for a while the active channels and then they become active according to their function. The unit starts receiving signals from the thermostat transmitters as its normal working.

While working the module continuously monitors every channel state to recognize a possible malfunction of the transmitter. If a transmitter does not send any signal in 90 minutes, for example if its battery is poor, the relevant channel will be put in an "alarm status".

When in "alarm status" the relevant led output blinks, and the channel output is turned off. Setting an option is possible to always provide a 30% on and 70% off power in the "alarm status" channels.

If one or more channels are 'non active' they will not be monitored and their leds will never blink.

To set 30% power function and other modalities perform a set-up of the option dip-switch (9) Fig. 2.

### OPTION DIP-SWITCH

- 1. 30% power:** **0** In case of alarm status always turn off the output.  
**1** In case of alarm status always provide the output a 30% of the power.
- 2. Jog valve:** **0** Jog valve never performed.  
**1** If one output is never turned on in 23 hours (stays always off), the output is turned on for 3 minutes.
- 3. Master pump:** **0** The pump output is activated according to the state of the channel outputs present on the same relay module.  
**1** The pump output is activated according to the state of the channel outputs of all the modules wired in chain.
- 4. Clock share:** **0** The clock switch signal is not put on the chain connection.  
**1** The clock switch signal is shared through the chain connection with other units.

The 30% option is useful in cold areas where not providing any power to a heating system may cause a damage.

In case of alarm status in one or more outputs, if the 30% power option is enabled, that output will be continuously turned on for 3 minutes and then turned off for 7 minutes, this to provide a minimum power with 30% duty.

When in alarm status, the relevant led of the channel (3) Fig. 1 blinks. It can blink in two different ways depending on the state of the output relay. If the output is turned off it stays off and flashes for a while, instead when the output is turned on the led stays on and turns off for a while.

Jog valve option is useful when the valves connected to the channel's outputs should not kept turned off for a long time to guarantee their working life. When jog valve option is enabled the receiving unit automatically activate each valve at least 3 minutes every day.

The circulator pump relay is turned on when at least one channel is on. When "Master pump" option is enabled the circulator pump relay will be driven according to the state of the channels of all the modules connected in chain.

When disabled the circulator pump relay is driven according to the state of the channels of the single unit.

The "clock share" option allows a chain of module connected together to use a unique comfort/reduction signal provided by a clock switch wired in one of the unit.

When the "clock share" option is enabled the clock switch signal of the unit is available through the data connection for the other units.

Other units without the clock switch wired will use the data connection signal when their "clock share" option is enabled.

In case your system does not require any special option, leave all the option switches in the "0" position.

### Mechanical installation

The mechanical installation consists in fixing the module on a wall or a frame with two screws.

Once removed the unit front panel, fix the case using the two screw holes shown in Fig. 2 (11).

While working with tools near the electronic parts, be sure that they are disconnected from the 230V~, and be careful not to damage the circuits or any other component.

Once the system is set up and the electrical installation has been done, proceed closing the case.

The cables should be bended as shown in Fig. 3 and inserted in the cable holder (12) in order to close the case and hold the cables correctly.

When using a cable holder remove with a tool the plastic tooth (13) Fig. 3 to open the cable intake.

Position the panel onto the case and fix the five closing screws (1) Fig. 1.

### Electrical installation

This section explain how to wire correctly the module: please read carefully the following and see Fig. 4 which shows the internal terminals layout and how they are internally connected.

Terminals 1 and 2 are the unit supply input: wire it to the 230V~, ensuring terminal 1 is the wired to the Neutral.

The electronic circuitry is internally protected with a self-resetting thermal fuse, meanwhile the loads are protected by a 1A fuse **F1** (8) Fig. 2.

Terminals 3 and 4 are the auxiliary load supply, terminals 5 to 16 are the 6 loads outputs.

When delivered the module is internally bridged to the power supply line (230V~) and therefore is capable of supplying directly the loads wired to its terminals 5 to 16 as shown in Fig. 4.

In this case the auxiliary supply in 3 and 4 must not be connected and the loads are driven with 230V~ voltage.

If the loads need to be driven with a different voltage (as an example a 24V~ load) the receiving unit must be slightly modified as following.

1. Cut the wire bridges **JP1** and **JP2** labeled as (6) and (7) Fig. 2 and completely remove them. This will remove the 230V~ supply to the internal bus for the loads.
2. Wire to terminals 3 and 4 (Fig. 4) an external power source (as an example a transformer with 24V~ output).
3. Wire to terminals 5 .. 16 the loads you have to drive. These loads must be rated for the voltage that you are supplying at terminals 3 and 4.
4. Check the loads protection fuse **F1** (8) Fig. 2, it must be rated according to the maximum loads current (see following).

The user must take into account the power consumption of the loads and be sure that the external power source is capable of delivering the total power needed in the worst

case (when all loads are turned on).

As an example if you are using 6 electrothermal zone valves rated 6W each at 24V~ then you need at least an external transformer with an output of 24V~ and 6W x 6 valves = 36W rated power (a safety margin in power of 10% in excess is highly suggested: in the previous example this means that the transformer should be rated at least 40W).

The loads protection fuse **F1** (8) Fig. 2 is provided with a rating current of 1A, it should guarantee a good protection for all kinds of 230V~ loads.

If 24V~ loads are to be driven, we recommend to replace the fuse **F1** (8) Fig. 2 with a higher rating current one, please ask your local distributor for more information.

Terminals 17 and 18 are the auxiliary circulator pump output terminals.

These are voltage free contacts, to allow for the use of a pump working at the desired voltage.

Please follow the wiring diagram of Fig. 4 for the pump connection.

Terminals 19 and 20 (Fig. 4) are the inputs for an external clock switch.

If the wireless thermostats used in the wireless system provide a 3°C reduction (such as wireless room thermostat), by connecting an external clock the system will be able to regulate the temperatures with a programmed reduction of 3°C.

To enable the programmed reduction, just wire terminals 19 and 20 to the output contacts of an electronic or electromechanic clock.

When the clock contacts are closed, the system will regulate according to the comfort set point, when they are open the regulation will be performed according to the 3° C reduced set point.

Note that if you do not connect any clock, the inputs 19 and 20 are always open, so this will make the system perform the reduced set point regulation, however in the thermostat can always be manually forced the comfort set point.

In this case there will not be a programmed reduction, but you will be able to manually select the comfort or reduced set point from the thermostat panel selector (in the wireless room thermostat the sun or moon position; see thermostat documentation for more information).

If you desire the receiving unit never work with any reduction, just wire terminals 19 and 20 together.

All thermostats with no 3°C reduction will never work with any reduction regardless the state of the clock inputs.

In the plug "Signal IN" must be connected the cable of the active antenna, or the output signal of another module if the system requires more than 6 relays.

Every device provides the antenna's signal to expand the system on the output plug "Signal OUT".

See the wiring examples in Fig. 5 and Fig. 6. Up to ten units can be connected in chain to the same active antenna.

### Maintenance

No particular maintenance is required for this product. Periodically check for the good quality of the received signals.

In case the signal is too weak or absent in one or more channels, the relevant output led blinks.

This could happen if the transmitter battery is flat.

In case the fuse is blown (see trouble shooting) remove power supply, check the electrical plant and the valves connected. Replace the blown fuse with a model of identical type and ratings.